

## CLAIMS

What is claimed is:

1. A method, comprising:
  - receiving a packet at a network device, the packet including a destination address;
  - indexing into a table using a portion of the destination address to locate an entry in the table associated with the portion of the destination address;
  - deriving a pool index associated with the portion of the destination address to identify a pool of data blocks from among a plurality of pools of data blocks; and
  - navigating the entry and the pool of data blocks that is identified to find a next-hop for the packet.
2. The method of claim 1 wherein the entry in the table comprises a next-hop pointer and a next-trie pointer.
3. The method of claim 2 wherein each data block of the pool of data blocks comprises a plurality of data entries, each data entry of the plurality of data entries comprises a next-hop pointer and a next-trie pointer.
4. The method of claim 3 wherein navigating the entry and the pool of data blocks comprises:

updating a next-hop-to-return with the next-hop pointer if the next-hop pointer is not null;

following the next-trie pointer to a data block within the pool if the next-trie pointer is not null and indexing into the data block with a second portion of the destination address; and

following the next-hop-to-return to a next-hop table if the next-trie pointer is null.

5. The method of claim 1 wherein deriving the pool index comprises performing a hash on the portion of the destination address to obtain the pool index.

6. The method of claim 1 wherein deriving the pool index comprises reading the pool index associated with the portion of the destination address from the entry in the table.

7. The method of claim 1, further comprising:

examining the plurality of pools of data blocks to find an under-utilized pool;  
and

adding a second entry to the table indexed by a portion of a second destination address, a second pool index associated with the portion of the second destination address to correspond to the under-utilized pool.

8. The method of claim 1, further comprising:

examining the plurality of pools of data blocks to find an under-utilized pool;  
splitting the under-utilized pool into a first pool of data blocks and a second pool of data blocks; and

adding a second entry to the table indexed by a portion of a second destination address, a second pool index associated with the portion of the second destination address to correspond to the second pool of data blocks.

9. The method of claim 1, further comprising:

examining the plurality of pools of data blocks to find a potential overflow pool; and

adding a second entry to the table indexed by a portion of a second destination address, a second pool index associated with the portion of the second destination address not to be associated with the potential overflow pool.

10. A method, comprising:

receiving a packet at a router, the packet including a destination internet protocol (IP) address;

indexing into a table comprising a plurality of trie entries using a portion of the destination IP address to find a trie entry of the plurality of trie entries, wherein each trie entry comprises 64-bits; and

following the trie entry to find a next-hop for the packet.

11. The method of claim 10 wherein each trie entry of the plurality of trie entries comprises a next-hop pointer and a next-trie pointer.

12. The method of claim 11 wherein following the trie entry comprises:

updating a next-hop-to-return with the next-hop pointer if the next-hop pointer is not null;

following the next-trie pointer to a trie block if the next-trie pointer is not null and indexing into the trie block with a second portion of the destination IP address; and

following the next-hop-to-return to a next-hop table if the next-trie pointer is null.

13. A method, comprising:

receiving a packet at a router, the packet including a destination internet protocol (IP) address;

indexing into a table comprising a plurality of trie entries using a portion of the destination IP address to find a trie entry of the plurality of trie entries, wherein each trie entry comprises a next-hop pointer and a next-trie pointer, the next-trie pointer comprising more bits than the next-hop pointer; and

following the trie entry to find a next-hop for the packet.

14. The method of claim 13 wherein the next-hop pointer comprises 8-bits and the next-trie pointer comprises 24-bits.

15. The method of claim 13 wherein following the trie entry comprises:

updating a next-hop-to-return with the next-hop pointer if the next-hop pointer is not null;

following the next-trie pointer to a trie block if the next-trie pointer is not null and indexing into the data block with a second portion of the destination IP address; and

following the next-hop-to-return to a next-hop table if the next-trie pointer is null.

16. An article of manufacture comprising:

a machine-readable medium including a plurality of instructions which when executed perform operations comprising:

receiving a packet at a router, the packet including a destination internet protocol (IP) address;

indexing into a table using a portion of the destination IP address to locate an entry in the table associated with the portion of the destination IP address;

deriving a pool index associated with the portion of the destination IP address to identify a pool of trie blocks from among a plurality of pools of trie blocks; and

navigating the entry and the pool of trie blocks that is identified to find a next-hop for the packet.

17. The article of manufacture of claim 16 wherein the entry in the table comprises a next-hop pointer and a next-trie pointer.

18. The article of manufacture of claim 17 wherein each trie block of the pool of trie blocks comprises a plurality of trie entries, each trie entry of the plurality of trie entries comprises a next-hop pointer and a next-trie pointer.

19. An article of manufacture of claim 18 wherein navigating the entry and the pool of trie blocks comprises:

- updating a next-hop-to-return with the next-hop pointer if the next-hop pointer is not null;

- following the next-trie pointer to a trie block within the pool if the next-trie pointer is not null and indexing into the trie block with a second portion of the destination IP address; and

- following the next-hop-to-return to a next-hop table if the next-trie pointer is null.

20. The article of manufacture of claim 16 wherein deriving the pool index comprises performing a hash on the portion of the destination IP address to obtain the pool index.

21. The article of manufacture of claim 16 wherein deriving the pool index comprises reading the pool index associated with the portion of the destination IP address from the entry in the table.

22. The article of manufacture of claim 16 wherein execution of the plurality of instructions further perform operations comprising:

- examining the plurality of pools of trie blocks to find an under-utilized pool;
- and

- adding a second entry to the table indexed by a portion of a second destination IP address, a second pool index associated with the portion of the second destination IP address to correspond to the under-utilized pool.

23. The article of manufacture of claim 16 wherein execution of the plurality of instructions further perform operations comprising:

- examining the plurality of pools of trie blocks to find an under-utilized pool;
- splitting the under-utilized pool into a first pool of trie blocks and a second pool of trie blocks; and

- adding a second entry to the table indexed by a portion of a second destination IP address, a second pool index associated with the portion of the second destination IP address to correspond to second pool of trie blocks.

24. The article of manufacture of claim 16 wherein execution of the plurality of instructions further perform operations comprising:

examining the plurality of pools of trie blocks to find a potential overflow pool;  
and

adding a second entry to the table indexed by a portion of a second destination address, a second pool index associated with the portion of the second destination IP address to not be assigned to the potential overflow pool.

25. A network device, comprising:

a plurality of ports;

a processor communicatively coupled to each of the plurality of ports; and

a storage device operatively coupled to the processor, the storage device including a plurality of instructions which when executed by the processor perform operations comprising:

receiving a packet at a first port of the plurality of ports, the packet including a destination address;

indexing into a table using a portion of the destination address to locate an entry in the table associated with the portion of the destination address;

deriving a pool index associated with the portion of the destination address to identify a pool of trie blocks from a plurality of pools of trie blocks;

navigating the entry and the pool of trie blocks to find a next-hop for the packet; and

outputting the packet from a second port of the plurality of ports to the next-hop.



26. The network device of claim 25 wherein the plurality of pools of trie blocks is stored as a link list in a memory device operatively coupled to the processor.

27. The network device of claim 25 wherein deriving the pool index comprises performing a hash on the portion of the destination address to obtain the pool index.

28. The network device of claim 25 wherein deriving the pool index comprises reading the pool index associated with the portion of the destination address from the entry in the table.